

# Work Order ID 81022

\*81022\*

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Tuesday, March 06, 2012 4:03:51 PM

Item ID: D6015-125 Accept \*N900040100\* Setup Start \*NS1\*  
 Revision ID: Stop \*NS2\*  
 Item Name: Crosstube Material  
 Start Date: 3/6/2012 Start Qty: 60.00 \*60\* Cust Item ID:  
 Required Date: 3/30/2012 Req'd Qty: 60.00 \*60\* Customer:  
 Reference:

Approvals: Process Plan: ✓ Date: 12-03-6 Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_  
 Run Start \*NR1\*  
 Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D6015	Rev B								

100 PURCHASING 0.00  
 \*100\*  
 Purchasing Memo 0.00  
 Purchasing Issue P/O 16357  
 A) Extrude and manufacture as per Dwg D6015  
 B) Material: AISI 4130 (AMS 6371) seamless steel tube  
 C) Material certification

110 Receive & Inspect for Damage & Mat'l Certs 0.00  
 \*110\*  
 Packaging Memo 0.00  
 Packaging Ensure material certification is attached

120 QC6- Inspect dimensions to drawing 0.00  
 \*120\*  
 QC Memo 0.00  
 Quality Control Ensure Material certification comply to Dwg D6015

inspectors QM 15

DAS  
16

17/09/12

12-03-6

12/11/12

03/01/9

670

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**Work Order ID 81022**


Tuesday, March 06, 2012 4:03:52 PM

**\*81022\***

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Item ID: D6015-125 Accept **\*N900040100\*** Setup Start **\*NS1\***  
Revision ID: Stop **\*NS2\***  
Item Name: Crosstube Material  
Start Date: 3/6/2012 Start Qty: 60.00 **\*60\*** Cust Item ID:  
Required Date: 3/30/2012 Req'd Qty: 60.00 **\*60\*** Customer:  
Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130 <b>*130*</b> HandFinish Hand Finishing	 Chemical Conversion Coat per QSI005 4.1 Memo	0.00 0.00	N/A						
140 <b>*140*</b> Packaging Packaging	Identify as per dwg & Stock Location: <i>Back Hall</i> Memo	0.00 0.00							
150 <b>*150*</b> QC Quality Control	QC21- Final Inspection - Work Order Release Memo	0.00 0.00							

*DP 12-9-12*  
*CF/or 12-9-12*  
*12/9/13*  
*12-09-12*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Picklist Print

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Tuesday, March 06, 2012 4:03:57 PM

Work Order ID: 81022

\*81022\*

Parent Item: D6015-125

\*D6015-125\*

Parent Item Name: Crosstube Material

Start Date: 3/6/2012

Required Date: 3/30/2012

Start Qty: 60.00

Required Qty: 60.00

Comments: IPP Rev:A 11.02.18 new issue DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

D6015-125P

Purchased

No

110

Each

0.0000

1

60

\*D6015-125P\*

\*\*

Crosstube Material

4/27/11 (20)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

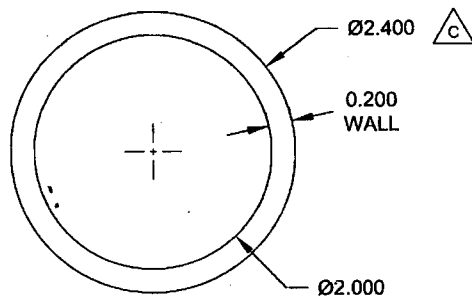
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

# SPECIFICATION CONTROL DRAWING



## NOTES

- 1) D6015-XXX CROSSTUBE  
LENGTH

WHERE XXX IS LENGTH IN INCHES  
EG. 125" LONG TUBE: D6015-125

- 2) MATERIAL: AISI 4130 (AMS 6371) SEAMLESS STEEL TUBE  
2.400 OD x 2.000 ID  
ANNEALED

- 3) TOLERANCES ARE PER ASTM A519 AS FOLLOWS:

O.D.: +0.007/-0.000

I.D.: +0.000/-0.007

LENGTH: XXX +0.188/-0.000

STRAIGHTNESS: 0.010" DEVIATION / 12" LENGTH

- 4) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 81022

8/12/03 to

RELEASED  
2011-01-18

C	2.400 WAS 2.500 (C5-1), ODxID WAS ODxWALL (A8-1)	CP	10.11.23
B	REMOVE "NORMALIZED"	CP	06.06.30
A	NEW ISSUE	CP	06.04.18
REV.	DESCRIPTION	BY	DATE
DESIGN	91		
DRAWN	91		
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

**DART AEROSPACE LTD**  
HAWKESBURY, ONTARIO, CANADA

DRAWING NO. REV. C  
D6015 SHEET 1 OF 1  
TITLE SCALE  
CROSSTUBE MATERIAL NTS

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries





Dart Aerospace Ltd.  
1270 Aberdeen Street  
Hawkesbury, ON K6A 1K7  
Tel: 613 632 9577  
Fax: 613 632 1053

## PURCHASE ORDER

Purchase Order ID **PO16360**

Purchase Order Date 3/07/12

PO Print Date 6/20/12

• Page Number 1 of 1

Order From :

VU-FAC001

FACTORY STEEL  
4020 OAKLAND AVE.  
DETROIT, MI 48203  
US

Contact Name  
Vendor Phone 313 883 6300  
Vendor Fax 313 883 4883  
Vendor Account Nbr

Buyer Brigitte Golden  
Requisition Nbr  
Tax Resale Nbr 10127-2607  
Terms Net 30  
Currency USD  
FOB Destination-Collect

To: DART AEROSPACE LTD 1270 ABERDEEN  
HAWKESBURY, ON K6A 1K7  
CANADA

*RECEIVED*

Line Nbr	Reference Revision ID Vendor Part Number	Description/ Mfg ID	Req Date/ Taxable	Req Qty/ Unit of Measure	Ship Method	Unit Price	Extended Price
	D6015-125P	Crosstube Material	7/31/12 Yes	70.00 Each	Yours ppd	\$179.6000	\$12,572.00
		Special Inst: As per DWG: D6015 Rev: B B81022 AISI 4130 (AMS 6371) seamless steel tube					
	WOOD SHIPPING CRATE		7/31/12 Yes	1.00 Each	Yours ppd	\$500.0000	\$500.00

PO Total: \$13,072.00

**MATERIAL CERTIFICATION  
REQ'D UPON DELIVERY**

Change Nbr: 3

Change Date: 6/20/12

*CL*  
No substitution or deviation without  
consent.  
Certificate of Conformity or Material  
Certification required **YES** NO

# PACKING LIST

No. 32842

PG 1 OF 1

PL

FACTORY STEEL & METAL SUPPLY 14020 OAKLAND AVENUE DETROIT, MI 48203		PURCHASE ORDER # 16360		BUYER BRIDGITTE GOLDEN		SHIP DATE 06/25/2012	
(313)883-6300 PHONE (313)883-4883 FAX		JOB NAME		Tel (613) 632-3336 Fax (613) 632-4443		SHIP VIA YRC	
SOLD TO DART AEROSPACE 1270 ABERDEEN STREET HAWKESBURY, ON K6A 1K7		SALES ORDER # 26685		ORDER DATE 04/30/2012		SALES REP MICK HALON	
		SHIP TO DART AEROSPACE 1270 ABERDEEN STREET HAWKESBURY, ON K6A 1K7		SHIP INST TRUCK		RESALE # 59-2958719	
				PRO#		CARRIER TRUCK	
				TERMS NET 30 DAYS		BLIND Y/N N	
						FOB DETROIT	

LINE	PCS	QUANTITY	DESCRIPTION	WIDTH	LENGTH	WEIGHT	UNIT PRICE	TOTAL
1	70		PRICE INCLUDES BOXING  4130N CD SMLSS RD TUBE 2.400" OD X .200W  Our Tag # Mill Ref # Heat # Pcs 78304 054455 002M57070 70		125"	3,427.084		
2	1		WOOD SHIPPING CRATE  MTRS (CIRCLE) FAX SHIPMENT INVOICE ALL  DATE: _____ INITIAL: _____					
TOTAL WT								TOTAL
3,427 LBS								
RECEIVED BY - SIGNATURE			RECEIVED BY - PRINTED NAME			DATE RECEIVED		

SO



## TEST REPORT

SHIPMENT  
001

7906

MICHIGAN SEAMLESS TUBE

SOUTH LYON, MICHIGAN 48178

ORDER NUMBER	CUSTOMER ORDER NUMBER	DATE	OFC	COM	DIWI	NET SLS	GR SLS	ACCOUNT NUMBER	US	PAGE
054455	1838	04/04/12	22	00	96	16	01	02598001FCO	2ME	1

FACTORY STEEL & METAL SUPPLY  
14020 OAKLAND

DETROIT

MI USA 48203

FACTORY STEEL & METAL SUPPLY  
14020 OAKLAND AVENUE

DETROIT

MI 48203

## ROUTING

OPEN TOP/FULLY TARPED/FOB SOUTH LYON MI

PPD TRUCK

ANALYSIS	SHAPE	PRODUCT	FC	ANNEAL	REQUESTED
4130	ROUND	COLD DRAWN		PER SPEC	06/15/12
SPECIFICATION		CMST	DESCRIPTION		PROMISE
SEAMLESS		AMS-6371/A519	CD ALLOY AIRCRAFT		06/15/12

## SPECIAL INSTRUCTIONS

OIL DEAR COMPLIANT.MRK/CERT A519-96,MILT-6736BN NOTE-2,AMS-6360L  
AMS-6371L,AMS-T-6736AN,4130H.CERT TO AMS-2301J.DECARB LEVELS TO  
AMS-6371.PROD FROM 1-HT.80M PSI MIN YLD,AIM 90.KERF +0.188"/-0.  
QTY VAR +10%/-0.STR & SURFACE CRITICAL.NO MARKS.CIRCUMFERENTIAL  
GRIND MARKS UNACCEPTABLE.MK W/GRADE&ALL SPECS.MAT'L TO BE BOXED.

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
		2.400	2.000			4.699		09:17:28
		+.0070	+.0000					06/19/12
		-.0000	-.0070					

ITM	BALE	--BALE--
NUM	NUM	PCS FTG
1	1 1	66 687
1	2 1	4 42

HEAT NO.
002M57070
002M57070

LENGTH
CUT 10' 5.000"
CUT 10' 5.000"

ITM	PART
STATUS	NUMBER
COM	
COM	

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Al	REMARKS
002M57070	.300	.550	.011	.017	.220	.100	1.030	.160	.250	.019	EF GERDAU

HEAT NO.	ULT. STR. PSI	YIELD, PSI	% ELONG 2"	HARDNESS	HYDRO TEST PSI	ULTRA SONIC %	EDDY CURRENT	EXPANSION
002M57070	98,982	91,350	21.9	HBW 212-217			OK	
					BEND	FLATTEN	FLARE	REV. FLATTEN
								FLANGE

DECARB OK GRAIN SIZE 8  
FREQ 0.00 SEV 0.00  
MACROS S1 R1 C1  
J1 J2 J3 J4 J5 J6 J7 J8 J9 J10  
51 49 48 43 39 33 33 33 32 32  
MELTED & MANUFACTURED IN USA

We hereby certify that the reported data are  
correct according to Michigan Seamless Tube  
tests and those of its suppliers.

8.2.P8.F9 Rev

# EXTRUSION INSPECTION SHEET

								ULTRA SONIC MEASUREMENTS				
		SIDE A	SIDE B									
TUBE #	TOTAL LENGTH	DIA two readings	DIA two readings	INSIDE DIA	wall thickness measured w/vern	Strightness at 12"	Rockwell Reading	LOCATION on tube	R1	R2	R3	R4
DWG	125.00"	2.400"		2.00"	0.200"	0.010"	N/A	Middle	N/A			
1	125.00"	2.401"/2.402"	2.404"/2.402"	1.993"	0.217"/0.199"	0.013"/0.001"	N/A	Middle	0.204"	0.207"	0.205"	0.202"
2	125.00"	2.406"/2.401"	2.404"/2.403"	1.992"	0.213"/0.199"	0.006"/0.002"	N/A	Middle	0.207"	0.195"	0.204"	0.213"
3	125.00"	2.404"/2.405"	2.403"/2.406"	1.995"	0.204"/0.199"	0.004"/0.004"	N/A	Middle	0.202"	0.202"	0.205"	0.205"
4	125.00"	2.404"/2.403"	2.403"/2.401"	1.996"	0.208"/0.204"	0.003"/0.006"	N/A	Middle	0.210"	0.203"	0.199"	0.204"
5	125.00"	2.406"/2.403"	2.404"/2.405"	1.993"	0.203"/0.207"	0.011"/0.001"	N/A	Middle	0.201"	0.210"	0.205"	0.199"
6	125.00"	2.401"/2.403"	2.407"/2.403"	1.993"	0.217"/0.188"	0.014"/0.005"	N/A	Middle	0.206"	0.210"	0.203"	0.197"
7	125.00"	2.404"/2.402"	2.404"/2.405"	1.992"	0.213"/0.193"	0.014"/0.006"	N/A	Middle	0.207"	0.204"	0.205"	0.208"
8	125.00"	2.407"/2.409"	2.406"/2.407"	1.992"	0.207"/0.212"	0.027"/0.005"	N/A	Middle	0.205"	0.207"	0.213"	0.213"
9	125.00"	2.404"/2.406"	2.405"/2.404"	1.997"	0.201"/0.205"	0.018"/0.005"	N/A	Middle	0.210"	0.204"	0.202"	0.208"
10	125.00"	2.403"/2.405"	2.406"/2.408"	1.995"	0.205"/0.210"	0.005"/0.004"	N/A	Middle	0.206"	0.210"	0.205"	0.201"
11	125.00"	2.404"/2.406"	2.403"/2.404"	1.993"	0.202"/0.209"	0.003"/0.003"	N/A	Middle	0.201"	0.212"	0.204"	0.204"
12	125.00"	2.402"/2.406"	2.402"/2.406"	1.993"	0.196"/0.213"	0.007"/0.009"	N/A	Middle	0.213"	0.204"	0.201"	0.210"
13	125.00"	2.403"/2.404"	2.409"/2.404"	1.995"	0.203"/0.204"	0.001"/0.001"	N/A	Middle	0.210"	0.204"	0.202"	0.207"
14	125.00"	2.405"/2.404"	2.403"/2.401"	1.992"	0.203"/0.214"	0.003"/0.007"	N/A	Middle	0.199"	0.208"	0.214"	0.202"
15	125.00"	2.404"/2.406"	2.405"/2.404"	1.994"	0.199"/0.213"	0.008"/0.006"	N/A	Middle	0.206"	0.217"	0.204"	0.195"
PART # D6015-125		P/O# 16359			BATCH # 81022			Notes: DAS 16 9-83 rlo/12				